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Comet *c* 1903 (BORRELLY)

From negatives by R. J. WALLACE

1. 1903 July 22: 12 hr. 1 m.—14 hr. 31 m. Cent. St. Time
2. " " 24: 11 hr. 59 m.—14 hr. 29 m. " "

P U B L I C A T I O N S  
OF THE  
Astronomical Society of the Pacific.

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VOL. XV. SAN FRANCISCO, CALIFORNIA, OCTOBER 10, 1903. No. 92.

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PHOTOGRAPHS OF COMET *c* 1903 (BORRELLY).

By R. J. WALLACE.

Through the courtesy of Professor E. E. BARNARD, the writer was privileged to make use of the camera and lens used by him for the purpose of continuing the series of negatives of Comet *c* during a portion of the month of July, which portion of time was fortunate enough to embrace the most interesting period of the comet's career, at least from a pictorial point of view.

The lens referred to is that belonging to a projection lantern manufactured by the Mackintosh Optical and Battery Company, of Chicago, and is the property of Director GEORGE E. HALE. Being of short focus with relatively large aperture,—viz., 1.6 inches diameter, with 6.3 inches focus,—it thus gives a wide field of fairly large area upon the plate and with excellent definition.

Upon the date of July 20th a negative taken by the writer shows clearly the tail extending to about  $9^{\circ}$ , single, and with no particular structure (exposure-time,  $2^h\ 25^m$ ), while that upon the evening following is not distinguished by any particular change (exposure-time,  $2^h\ 15^m$ ).

On the plate of July 22d a distinct change was observable, in that the tail had split up into four separate streamers, emanating from the head and trailing off into space with varying lengths readily measurable from  $6^{\circ}.5$  to  $16^{\circ}$ . The exposure-time was  $2^h\ 31^m$ , with a fairly good sky.

The negative of the ensuing evening (July 23d) was marked by a division of the tail into three, one of which was very faint but yet distinctly traceable, and extending to a distance of about  $14^{\circ}$ . Exposure-time,  $2^h\ 2^m$  with a fair sky.

The record of the 24th showed a marked change, the tail

having the appearance of being broken off transversely at a distance of  $3^{\circ}$  or  $4^{\circ}$  from the head, the inclination of the following division differing by about  $2^{\circ}$  from the direction of the longitudinal axis of that preceding. That this separation was taking place at a very rapid rate is shown by the negative of Professor BARNARD of that same evening, and preceding that of the writer by a mean of  $3^{\text{h}}\ 0^{\text{m}}$ , wherein the separation is shown very decidedly but only about  $0^{\circ}.3$  wide, as against  $0^{\circ}.5$  in the later negative.

Such a phenomenon was naturally the cause of much anticipatory interest in the results of the following evening, but by that time (according to a negative by Professor BARNARD) the tail had apparently completely coalesced, and from then on there is nothing recorded of unusual interest.

It may further be mentioned that prints from all pairs of negatives taken by Professor BARNARD and the writer, when properly matched, give perfect stereoscopic effect when so viewed, the comet hanging suspended considerably in front of the stars, and the structure of the tail clearly showing. Lack of space prevents the reproduction here of such a print.

All negatives were made upon Seed 27 gilt-edge plates, backed, reduced with hydrochinon liberally restrained with bromide, carefully shielded from the dark-room light, and developed until the appearance of chemical fog indicated the maximum effect.

YERKES OBSERVATORY, September 25, 1903.

## PLANETARY PHENOMENA FOR NOVEMBER AND DECEMBER, 1903.

BY MALCOLM MCNEILL.

### PHASES OF THE MOON, PACIFIC TIME.

Full Moon, Nov. 4, 9 <sup>h</sup> 27 <sup>m</sup> P.M.	Full Moon, Dec. 4, 10 <sup>h</sup> 13 <sup>m</sup> A.M.
Last Quarter, " 11, 6 46 P.M.	Last Quarter, " 11, 2 53 A.M.
New Moon, " 18, 9 10 P.M.	New Moon, " 18, 1 26 P.M.
First Quarter, " 26, 9 37 P.M.	First Quarter, " 26, 6 22 P.M.

The Sun reaches the winter solstice and winter begins December 22d, 4 P.M., Pacific time.

*Mercury* is a morning star at the beginning of November, having passed greatest west elongation about a fortnight be-